

MODULES 1 &2 IMPORTANT QUESTIONS

1. Find the conjugate of $-2+3i$

Ans : $-2-3i$

2. Find the conjugate of $-2-3i$

Ans : $-2+3i$

To find the conjugate, change the sign of the second part(imaginary part)

3. Find the modulus of $-1-\sqrt{5}i$

Ans: **Modulus** $= \sqrt{x^2 + y^2}$

$$\begin{aligned} x &= -1, y = -\sqrt{5}, \\ \text{Modulus} &= \sqrt{x^2 + y^2} = \sqrt{(-1)^2 + (-\sqrt{5})^2} \\ &= \sqrt{1 + 5} = \sqrt{6} \end{aligned}$$

$$(-1)^2 = 1, (-\sqrt{5})^2 = 5$$

4. Find the modulus of $-3 - \sqrt{7}i$

Ans: **Modulus** $= \sqrt{x^2 + y^2}$

$$\begin{aligned} x &= -3, y = -\sqrt{7}, \\ \text{Modulus} &= \sqrt{x^2 + y^2} = \sqrt{(-3)^2 + (-\sqrt{7})^2} \\ &= \sqrt{9 + 7} = \sqrt{16} = 4 \end{aligned}$$

$$(-3)^2 = 9, (-\sqrt{7})^2 = 7$$

5. Find the amplitude of the complex number $-3-2i$

Amplitude $, \theta = \tan^{-1}\left(\frac{y}{x}\right)$

$$x = -3, y = -2$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(\frac{-2}{-3}\right)$$

6. Find the amplitude of the complex number $1-\sqrt{3}i$

Amplitude $, \theta = \tan^{-1}\left(\frac{y}{x}\right)$

$$x = 1, y = -\sqrt{3}$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(\frac{-\sqrt{3}}{1}\right)$$

7. Find the product of the complex numbers

$$\begin{aligned} & (1 - 2i)(-1 - 7i) \\ &= 1(-1 - 7i) - 2i(-1 - 7i) \\ &= 1 \times -1 + 1 \times -7i - 2i \times -1 - 2i \times -7i \\ &= -1 - 7i + 2i + 14i^2 \\ &= -1 - 5i + 14 \times -1 \\ &= -1 - 5i - 14 \\ &= -15 - 5i \end{aligned}$$

- $1 \times -1 = -1$
- $-7i + 2i = -5i$
- $-2i \times -7i = 14i^2 = 14 \times -1 = -14$
- $-1 - 14 = -1 + -14 = -15$
- $i^2 = -1$

8. Find the product of the complex numbers

$$\begin{aligned} & (-3 - 2i)(6 - 7i) \\ &= -3(6 - 7i) - 2i(6 - 7i) \\ &= -3 \times 6 - 3 \times -7i - 2i \times 6 - 2i \times -7i \\ &= -18 + 21i - 12i + 14i^2 \\ &= -18 + 9i + 14 \times -1 \\ &= -18 + 9i - 14 \\ &= -32 + 9i \end{aligned}$$

- $-3 \times 6 = -18$
- $21i - 12i = 9i$
- $-2i \times -7i = 14i^2 = 14 \times -1 = -14$
- $-18 - 14 = -18 + -14 = -32$
- $i^2 = -1$

9. Find the equation of the line parallel to $3x - 2y - 5 = 0$ and passing through $(1, -2)$

Parallel Equation is $ax + by + k = 0$

$$a = 3, b = -2$$

$$3x - 2y + k = 0 \dots\dots\dots(1)$$

(1)pass through $(1, -2)$

So take $x = 1, y = -2$ in equation (1)

$$3 \times 1 - 2 \times -2 + k = 0$$

$$3 + 4 + k = 0$$

$$7 + k = 0$$

$$k = -7$$

Put $k = -7$ in equation (1)

Parallel equation is $3x - 2y - 7 = 0$

- $-2 \times -2 = 4$
- $7 + k = 0$
- $k = -7$

9. Find the equation of the line perpendicular to $5x - 2y - 1 = 0$ and passing through $(4, 2)$

Perpendicular Equation is $bx - ay + k = 0$

$$a = 5, b = -2$$

$$-2x - 5y + k = 0 \dots\dots\dots(1)$$

(1)pass through $(4, 2)$

So take $x = 4, y = 2$ in equation (1)

$$-2 \times 4 - 5 \times 2 + k = 0$$

$$-8 - 10 + k = 0$$

$$-18 + k = 0$$

$$k = 18$$

Put $k = 18$ in equation (1)

Parallel equation is $-2x - 5y + 18 = 0$

- $-2 \times 4 = -8$
- $-18 + k = 0$
- $k = 18$
- $-8 - 10 = -18$
- Parallel Equation is $ax + by + k = 0$

- Perpendicular Equation is $bx - ay + k = 0$

10. Convert degrees to radians

$$\pi \text{ radians} = 180^\circ$$

$$30^\circ = \frac{\pi}{6} \text{ radians} \quad \left(\frac{180}{6}\right)$$

$$60^\circ = \frac{\pi}{3} \text{ radians} \quad \left(\frac{180}{3}\right)$$

$$45^\circ = \frac{\pi}{4} \text{ radians} \quad \left(\frac{180}{4}\right)$$

2). Evaluate $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$

$$\text{Ans: } \sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ = \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{3}{4} + \frac{1}{4} = \frac{3+1}{4} = \frac{4}{4}$$

- $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \frac{3}{4}$
- $\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\tan 60^\circ = \sqrt{3}$, $\tan 30^\circ = \frac{1}{\sqrt{3}}$
- $\cos 60^\circ = \frac{1}{2}$, $\tan 45^\circ = 1$
- $\sin 30^\circ = \frac{1}{2}$, $\sin 0^\circ = 0$,
- $\cos 0^\circ = 1$
- $\cos 0^\circ = 1$

3) If $\tan \theta = 1$, Find $\sin \theta$ and $\cos \theta$

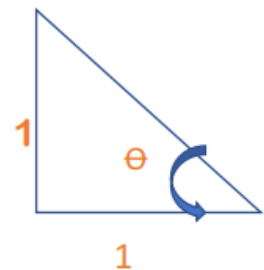
$$\text{Ans: } \tan \theta = 1 = \frac{1}{1} = \frac{\text{Opposite side}}{\text{Adjacent side}}$$

Opposite side = 1, Adjacent side = 1,

$$\text{Hypotenuse}^2 = 1^2 + 1^2 = 1 + 1 = 2$$

$$\text{Hypotenuse} = \sqrt{2}, \sin \theta = \frac{\text{Opposite side}}{\text{Hypotenuse}} = \frac{1}{\sqrt{2}}$$

$$\cos \theta = \frac{\text{Adjacent side}}{\text{Hypotenuse}} = \frac{1}{\sqrt{2}}$$



$$\sec \theta = \frac{1}{\cos \theta}, \operatorname{cosec} \theta = \frac{1}{\sin \theta}, \cot \theta = \frac{1}{\tan \theta}$$

$$\frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta} = 2 \sec \theta$$

4) Show that

$$\sin^2 \theta + \cos^2 \theta = 1, (a+b)^2 = a^2 + b^2 + 2ab$$

$$\frac{1}{\cos \theta} = \sec \theta$$

$$\begin{aligned} \frac{1+\sin \theta}{\cos \theta} + \frac{\cos \theta}{1+\sin \theta} &= \frac{(1+\sin \theta) \times (1+\sin \theta) + \cos \theta \times \cos \theta}{\cos \theta (1+\sin \theta)} \\ &= \frac{(1+\sin \theta)^2 + \cos^2 \theta}{\cos \theta (1+\sin \theta)} = \frac{1^2 + \sin^2 \theta + 2 \times 1 \times \sin \theta + \cos^2 \theta}{\cos \theta (1+\sin \theta)} \\ &= \frac{1^2 + \sin^2 \theta + \cos^2 \theta + 2 \sin \theta}{\cos \theta (1+\sin \theta)} = \frac{1+1+2 \sin \theta}{\cos \theta (1+\sin \theta)} = \frac{2+2 \sin \theta}{\cos \theta (1+\sin \theta)} \\ &= \frac{2(1+\sin \theta)}{\cos \theta (1+\sin \theta)} = \frac{2}{\cos \theta} = 2 \sec \theta, \end{aligned}$$

$$* \quad 2 + 2 \sin \theta = 2(1 + \sin \theta),$$

5.

Show that $\frac{\sin A}{1-\cos A} + \frac{1-\cos A}{\sin A} = 2 \operatorname{cosec} A, (a-b)^2 = a^2 + b^2 - 2ab$

- $\frac{1}{\sin A} = \operatorname{cosec} A$
- $\sin^2 A + \cos^2 A = 1$
- $(1 - \cos A)^2 = 1^2 + \cos^2 A - 2 \cos A$

$$\begin{aligned} \frac{\sin A}{1-\cos A} + \frac{1-\cos A}{\sin A} &= \frac{\sin A}{1-\cos A} + \frac{1-\cos A}{\sin A} = \\ \frac{\sin A \times \sin A + (1-\cos A) \times (1-\cos A)}{(1-\cos A) \times \sin A} &= \frac{\sin^2 A + (1-\cos A)^2}{(1-\cos A) \times \sin A} \\ \frac{\sin^2 A + 1^2 + \cos^2 A - 2 \cos A}{(1-\cos A) \times \sin A} &= \frac{\sin^2 A + \cos^2 A + 1 - 2 \cos A}{(1-\cos A) \times \sin A} \\ &= \frac{1+1-2 \cos A}{(1-\cos A) \times \sin A} = \frac{2-2 \cos A}{(1-\cos A) \times \sin A} = \frac{2(1-\cos A)}{(1-\cos A) \times \sin A} \\ &= \frac{2}{\sin A} = 2 \operatorname{cosec} A \end{aligned}$$

